UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,849	04/28/2006	Chiaki Sotowa	Q78376	4869

23373 7590 02/13/2009

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
GREGORIO, GUINEVER S	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
02/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,849	SOTOWA ET AL.	
	Examiner	Art Unit	
	GUINEVER S. GREGORIO	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *23-27 and 34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22 and 28-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/28/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I, claims 1-22 and 28-33 in the reply filed on 12/08/2008 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 7 and 11 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Regarding claims 7 and 11, both claims recite "a 5 micron square region arbitrarily selected from a transmission electron microscope bright field image of a cross-section surface obtained by cutting the particle into flake form". The phrase "arbitrarily" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-11, 21, 22 and 28-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitagawa et al. (U.S. Pat. No. 6,723,471 B2). Kitagawa et al. teaches a negative electrode material comprised of graphite powder with a carbon precursor fired within a range of 700 to 2800 ºC (paragraph 12). Furthermore, Kitagawa et al. teaches the x-ray diffraction ratio of (110)/(004) is 0.015 or more which corresponds to an intensity peak of 0.1 or more for peak intensity attributed to a (110) plane to peak intensity attributed to a (004) plane determined through x-ray diffraction (paragraph 18).

4. The carbon material of Kitagawa et al. would thus obviously have the claimed peak intensity through analysis on a mixture of the carbon material and a binder resin when pressed at 10^3 kg/cm^2 or higher, as claimed.

5. Regarding claims 2 and 3, Kitagawa et al. teaches natural or artificial scaly or flaky graphite of high purity and high crystallinity which corresponds to natural graphite that has a C_0 value of a (002) plane of 0.6703 to 0.6800(column 4, lines 45-46). Furthermore, Kitagawa et al. teaches the plane interval (d002) of (002) plane by wide angle X-ray diffraction method is less than 3.37 angstroms which corresponds to half of C_0, and the size (Lc) of crystallite in a C-axis direction is at least 1000 angstroms or more which corresponds to 100 nm or more (paragraph 22). Furthermore, Kitagawa et al. teaches a spherical graphite and therefore the radius in other planes such as the a-axis should corresponds with the length of the c –axis (paragraph 28, line 6).

6. Regarding claim 4, Kitagawa et al. teaches mean particle size or 10 to 30 microns which overlaps with 10 to 40 microns (paragraph 24).

7. Regarding claim 5, Kitagawa et al. teaches the shape factor should be spherical, with a mean roundness (the ratio of the peripheral length of a circle corresponding to the particle area as the numerator to the peripheral length of the projected particle image as the denominator, which becomes closer to 1 when the particle image is closer to true roundness, and becomes smaller as the particle image is slender or rugged) of 0.940 or more which overlaps with a mean roundness of 0.85 to 0.99 (paragraph 28, lines 14-20).

8. Regarding claim 6, Kitagawa et al. teaches the Raman Spectroscopy intensity ratio is 0.3 or less (paragraph 23).

9. Regarding claim 7 and 11, Examiner takes the position that the graphite carbon taught by Kitagawa would obviously posses the limitations recited by applicant because Kitagawa recites limitations which are commensurate with applicant's limitations (paragraph 22-27).

10. Regarding claim 8, Kitagawa et al. teaches organic carbon precursor (paragraph 31).

11. Regarding claim 9, Kitagawa et al. teaches the rate of the carbonaceous matter (organic carbon precursor) in the carbonaceous powder of plural-layer structure is adjusted to be 0.1 wt % or more and not exceeding 50 wt (paragraph 32, lines 7-10).

12. Regarding claims 10 and 11, Kitagawa et al. teaches the lumpy graphite particles having the above characteristics (1) to (6) are composed of natural or artificial scaly or flaky graphite of high purity and high crystallinity (paragraph 28, lines 1-3). Furthermore examiner takes the position that the graphite described by Kitagawa would obviously posses the crystalline/ amorphous regions recited by applicant because Kitagawa recites limitations which are commensurate with applicant's limitations (paragraph 22-27).

13. Regarding claim 21, most of the limitations recited in claim 21 have been addressed in previous claims. Please see arguments supra. Furthermore, Kitagawa et al. teaches BET specific surface area is 3.5 to 10.0 m^2/g which overlaps with 0.2 to 5 TAP density is different method of measuring density than true density. However,

Examiner takes the position that the graphite described by Kitagawa would obviously posses the density requirements recited by applicant because Kitagawa recites limitations which are commensurate with applicant's limitations (paragraph 22-27).

14. Regarding claim 22, Kitagawa et al. teaches the graphite particles that have thus been selected should preferably have a specific capacity of 330 mAh/g or more, more preferably 350 mAh/g or more (paragraph 30, lines 3-6).

15. Regarding claim 28, Kitagawa et al. teaches a paste for producing a battery electrode (paragraph 76, lines 6-10).

16. Regarding claim 29, Kitagawa et al. teaches applying this paste on both sides of an aluminum foil used as a current collector, drying and pressing it by a roll, and cutting it to a prescribed size which corresponds to an electrode formed of a compact of a paste (paragraph, 76, lines 10-13).

17. Regarding claim 30, please see claim 1 supra.

18. Regarding claims 31, Kitagawa et al. teaches battery using carbonaceous powder (paragraph 49, line 1).

19. Regarding claim 32, Kitagawa et al. teaches a nonaqueous secondary cell (abstract, line 3).

20. Regarding claim 33, Kitagwa et al. teaches Kitagawa et al. teaches ethylene carbonate and diethyl carbonate which correspond to the non-aqueous solvents recited by applicant (paragraph 70, lines 19-22).

21. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitagawa as applied to claim 1 above, and further in view of Yin et al. (The effect of Boron Doping on Lithium Intercalation Performance of Boron-Doped Carbon Materials; Material of Chemistry and Physics; 80, 94-101; 2003).

22. Kitagawa teaches enhancement of the storage property at a high temperature and discharge characteristics at a low temperature of a nonaqueous electrolyte secondary cell (abstract, lines 1-4). Kitagawa does not teach doping the carbon material with boron. Yin et al. teaches boron-doped carbon posses an increased reversible capacity and the boron doping the reversible capacity of lithium intercalation and the decrease of irreversible capacity which all attribute the improving the improved function of battery electrodes. It would have been obvious to one of ordinary skill in the art at the time of the invention to dope the carbon material used by Kitagawa et al. because boron-doped carbon further improves the efficiency of battery electrodes.

23. Claims 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitagawa et al. as applied to claim 1 above, and further in view of Morita et al. (U.S. Pub. No. 2003/0044603 A1).

24. Kitagawa teaches enhancement of the storage property at a high temperature and discharge characteristics at a low temperature of a nonaqueous electrolyte secondary cell (abstract, lines 1-4). Kitagawa et al. does not teach carbon fibers.

25. Morita et al. teaches a battery electrode containing the fine carbon fiber so as to attain improved charge/discharge capacity and exhibit improved strength, the battery

electrode being employed as a positive or negative electrode of any of a variety of secondary batteries such as dry batteries, Pb storage batteries, capacitors, and recently developed Li-ion secondary batteries (paragraph 3). Morita et al. teaches an electrode; for example, a negative electrode of a lithium battery, is formed from the fine carbon fiber of the present invention, the fine carbon fiber and a binder are added to a carbonaceous material such as graphite powder or mesophase carbon micro beads (MCMB), and the resultant mixture is sufficiently kneaded such that the carbon fiber is dispersed in the mixture as uniformly as possible (paragraph 73). Morita et al. teaches a vapor grown fine carbon fiber including a hollow space along the fiber in its interior, and having a multi-layer structure, an outer diameter of 2 to 500 nm, and an aspect ratio of 10 to 15,000 is disclosed (abstract, lines 1-4). Furthermore, Morita et al. teaches By virtue of its high electrical conductivity, when the fine carbon fiber of the present invention is employed in such a battery, the electrical conductivity of the resultant battery can be enhanced (paragraph 71, lines 1-4). Furthermore, Morita et al. teaches when the fine carbon fiber is employed in a lithium battery, the charge/discharge capacity of the battery can be increased, since the fine carbon fiber exhibits high intercalation performance as a carbon material for a negative electrode (paragraph 71, lines 4-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate carbon fibers in the carbonaceous material taught by Kitagawa because vapor grown carbon fibers enhance battery electrode performance.

26. Regarding claim 14, Kitagawa et al. does not teach addition of carbon fibers to battery electrodes. Morita et al. an electrode; for example, a negative electrode of a

lithium battery, is formed from the fine carbon fiber of the present invention, the fine carbon fiber and a binder are added to a carbonaceous material such as graphite powder or mesophase carbon micro beads (MCMB), and the resultant mixture is sufficiently kneaded such that the carbon fiber is dispersed in the mixture as uniformly as possible (paragraph 73, lines 3-7). Examiner takes the position that at least a portion of the carbon fiber will be deposited on a surface of the carbon material by adding fine carbon fibers and binder to graphite and mixing the composite. It would have been obvious to one of ordinary skill in the art at the time of the invention to add carbon fiber to a graphite composite binder because the carbon fibers enhance battery electrode performance.

27. Regarding claim 15, Kitagawa does not teach addition of carbon fibers to battery electrodes. Morita et al. teaches the amount of fine carbon fiber incorporated into an electrode (comprised of fine carbon fiber in accordance with the present invention and fine carbon fiber that is not in accordance with the present invention) is preferably 0.1 mass % to 20 mass % inclusive (paragraph 72). When the incorporation amount exceeds 20 mass %, the packing density of carbon in the electrode is lowered, thereby lowering the charge/discharge capacity of the resultant battery. In contrast, when the incorporation amount is less than 0.1 mass %, the effect of the fine carbon fiber is lowered (paragraph 72). The fine carbon fiber of the present invention is incorporated into the electrode in an amount of 2 to 100 vol. %, preferably 5 to 80 vol. %, more preferably 15 to 50 vol. %, on the basis of the total volume of fine carbon fiber incorporated into the electrode (paragraph 72). It would have been obvious to one of

ordinary skill in the art at the time of the invention to incorporate the proper amount of carbon fibers into the composite taught by Kitagawa et al. so that the battery electrode performance is improved but yet quality factors such as packing density are not sacrificed.

28. Regarding claim 16, Kitagawa et al. does not teach carbon fibers for battery electrodes. Morita et al. teaches carbon fibers with an aspect ratio of 10 to 15000 are added to battery electrodes to further enhance electrode functionality (abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to add fibers to a battery electrode to improve the function of the battery.

29. Regarding claim 17, Kitagawa et al. does not teach carbon fibers. Morita et al. teaches a fine carbon fiber obtained through heat treatment of a fine carbon fiber as recited in any one of 1) through 5) above at about 2,000 to about 3,500.degree. C is used to enhance a battery electrode (paragraph 24).

30. Regarding claim 18, Kitagawa et al. does not teach carbon fibers for battery electrodes. Morita et al. teaches a vapor grown fine carbon fiber including a hollow space along the fiber in its interior enhance battery electrode (abstract, lines 1-2). It would have been obvious to one of ordinary skill in the art at the time of the invention to add carbon fibers to the carbon electrode taught by Kitagawa because hollow carbon fibers improve the functionality of battery electrodes.

31. Regarding claims 19-20, Kitagawa et al. does not teach carbon fibers. Morita et al. teaches vapor grown carbon fibers (VGCF) which is commensurate with all the limitations recited in claims 12-18 of the application (see arguments suprae). Morita et

al. does not teach branching or spacing between the interlayer planes. However, Examiner takes the position that since Morita teaches a fiber produced by the same method recited by applicant (vapor grown and heat treated) then Morita VGCF would be branched and posses the recited interlayer spacing. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use branched carbon fibers with a interlayer spacing of 0.344 nm or more obtained by vapor phase growth because the carbon fibers would enhance the battery electrode's functionality.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is (571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gsg
February 9, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793